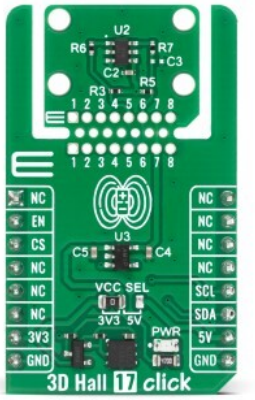
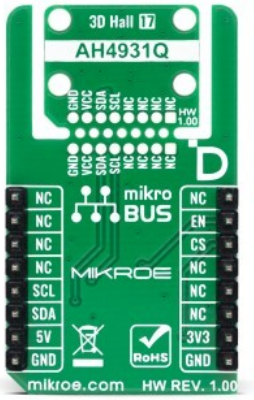
MIKROELEKTRONIKA D.O.O, Batajnički drum 23, 11000 Belgrade, Serbia
VAT: SR105917343 Registration No. 20490918
Phone: + 381 11 78 57 600 Fax: + 381 11 63 09 644 E-mail: office@mikroe.com
www.mikroe.com

3D Hall 17 Click





PID: MIKROE-7024

3D Hall 17 Click is a three-axis magnetic sensing board for contactless position, movement, and rotational measurements in embedded systems. It features the AH4931Q-W6-7 linear Hall-effect sensor from Diodes Incorporated, measuring X, Y, and Z magnetic fields across a ±1300G range with 12-bit resolution and update rates up to 3.3kHz. I2C control enables magnetic and temperature data acquisition, operating-mode configuration, programmable wake-up thresholds, and low-power operation, while hardware enable, selectable 3.3V or 5V supply, ClickID, and Click Snap support flexible integration. It is suitable for joysticks, rotary controls, gear shifters, robotic positioning, flow meters, load detection, and motor commutation.

For more information about **3D Hall 17 Click** visit the official product page.

How does it work?

3D Hall 17 Click is based on the AH4931Q-W6-7, an automotive-qualified three-axis linear Hall-effect sensor from Diodes Incorporated. The sensor measures the X, Y, and Z components of an applied magnetic field, allowing the host system to track three-dimensional, linear, and rotational movement without mechanical contact. Its analog front end uses dedicated Hall elements, chopper-based offset cancellation, a fully differential signal chain, and an integrated ADC to digitize the magnetic field measurements. The resulting data is processed by an internal finite state machine and DSP before being stored in output registers. Each axis provides a signed 12-bit measurement with a typical resolution of 1G/LSB and a usable linear range of ±1300G (±130mT). These capabilities make the board suitable for joysticks, knobs and levers, rotary selectors, long-stroke position sensing, gear shifters, robotic shaft positioning, flap and mirror positioning, flow meters, load detection, motor commutation, and

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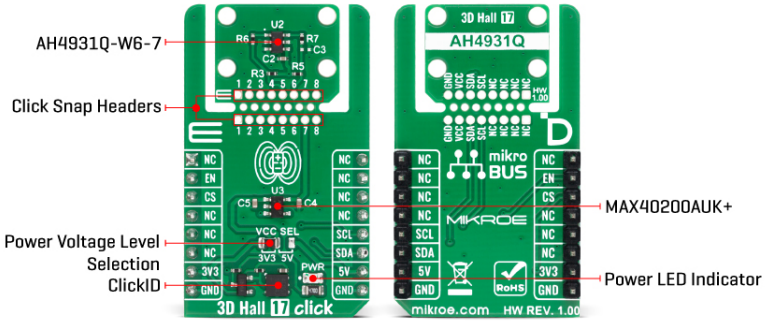
similar non-contact control applications.



The AH4931Q also integrates a temperature sensor that measures its junction temperature from -40°C to +125°C with a resolution of 1°C/LSB. Temperature data is used internally to compensate magnetic sensitivity and offset drift, while also being available to the host controller for monitoring. Several programmable operating modes allow measurement speed and power consumption to be adapted to the application. Continuous Fast mode provides an update rate of up to 3.3kHz, Low-Power mode operates at 83.3Hz, and Ultra-Low-Power mode performs measurements at 10Hz with a typical current consumption of only 13µA. On-demand operating modes allow the host MCU to initiate measurement cycles through data readout, while Power-Down mode reduces the typical sensor current to only 9nA. The sensor also includes a configurable wake-up function with independent upper and lower magnetic thresholds for all three axes. If any measured axis leaves its programmed threshold window, the device can generate an interrupt to wake the host controller, making it well suited to battery-powered position monitoring and event-driven detection systems.

3D Hall 17 Click communicates with the host MCU through the I2C interface using the SDA and SCL lines of the mikroBUS™ socket. The AH4931Q operates as an I2C peripheral, allowing the controller to read magnetic and temperature measurements and configure operating modes, interrupt behavior, wake-up thresholds, and other sensor functions. The interface supports I2C Fast mode at up to 400kHz and operation at up to 1MHz when the electrical characteristics of the bus allow it. The sensor combines its clock and active-low interrupt functions on the same SCL/INT pin, so conversion-complete and magnetic wake-up pulses can also be signaled through the SCL line when enabled. The board includes the recommended 1.2kΩ pull-up resistors on both I2C lines. An additional enable signal, labeled EN, is routed to the RST pin of the mikroBUS™ socket and controls the MAX40200 ideal-diode current switch supplying the sensor. Driving EN low disconnects the sensor supply, while driving it high enables normal operation. The CS pin is reserved for ClickID communication, while the remaining mikroBUS™ signal pins are not used.

This Click board™ supports the Click Snap feature, allowing the section containing the AH4931Q to be separated from the main board and positioned independently. After separation, the sensor supply and I2C signals remain directly accessible through the numbered connection pads, while the four mounting holes on the detachable section simplify secure installation near a moving magnet or mechanical assembly. The board also includes a green PWR LED that indicates the presence of the selected supply voltage and the ClickID identification system, which allows a compatible host platform to automatically recognize the connected Click

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board™ and retrieve its identification data.

3D Hall 17 Click can operate from either the 3.3V or 5V power rail of the mikroBUS™ socket. The desired supply and I2C logic level are selected through the VCC SEL jumper, which is set to the 3.3V position by default. The selected voltage is delivered to the sensor through the MAX40200 power path, allowing the EN signal to provide hardware-level control over sensor power. This Click board™ comes equipped with a library containing easy-to-use functions and a ready-to-use code example that can be used as a reference for further development.

Click Snap

Click Snap is an innovative feature of our standardized Click add-on boards, designed to bring greater flexibility and optimize your prototypes. By simply snapping the PCB along predefined lines, you can easily detach the main sensor/IC/module area, reducing the overall size, weight, and power consumption - ideal for the final phase of prototyping. For more details about Click Snap, visit the official page dedicated to this feature.

Specifications

Type	Magnetic
Applications	Ideal for applications such as joysticks, knobs and levers, rotary selectors, gear shifters, robotic shaft positioning, flow meters, load detection, and motor commutation
On-board modules	AH4931Q-W6-7 - automotive-qualified 3D magnetic linear Hall-effect sensor with I2C interface from Diodes Incorporated
Key Features	Three-axis magnetic field sensing, ±1300G linear range, 12-bit resolution, update rates up to 3.3kHz, integrated temperature sensing and compensation, programmable wake-up thresholds, multiple low-power operating modes, I2C interface, Click Snap, ClickID, and more
Interface	I2C
Feature	Click Snap,ClickID
Compatibility	mikroBUS™
Click board size	M (42.9 x 25.4 mm)
Input Voltage	3.3V or 5V

Pinout diagram

This table shows how the pinout on 3D Hall 17 Click corresponds to the pinout on the mikroBUS™ socket (the latter shown in the two middle columns).

Notes	Pin	mikroBUS				Pin	Notes
	NC	1	AN	PWM	16	NC	

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Enable	**EN**	2	RST	INT	15	NC	
ID COMM	**CS**	3	CS	RX	14	NC	
	NC	4	SCK	TX	13	NC	
	NC	5	MISO	SCL	12	**SCL**	I2C Clock
	NC	6	MOSI	SDA	11	**SDA**	I2C Data
Power Supply	**3.3V**	7	3.3V	5V	10	**5V**	Power Supply
Ground	**GND**	8	GND	GND	9	**GND**	Ground

Onboard settings and indicators

Label	Name	Default	Description
LD1	PWR	-	Power LED Indicator
JP1	VCC SEL	Left	VCC Selection Jumper

3D Hall 17 Click electrical specifications

Description	Min	Typ	Max	Unit
Supply Voltage	3.3	-	5	V
Magnetic Range (X,Y,Z)	-1300	-	+1300	Gauss
Resolution 12bit	-	1	-	G/LSB
Sensitivity X, Y, Z	-	1	-	LSB/G

Software Support

3D Hall 17 Click demo application is developed using the NECTO Studio, ensuring compatibility with mikroSDK's open-source libraries and tools. Designed for plug-and-play implementation and testing, the demo is fully compatible with all development, starter, and mikromedia boards featuring a mikroBUS™ socket.

Example Description

This example demonstrates the use of the 3D Hall 17 Click board by reading and displaying the magnetic flux density on all three axes (X, Y, Z) in Gauss, and the sensor die temperature in degrees Celsius.

Key Functions

- c3dhall17_cfg_setup This function initializes Click configuration structure to initial values.
- c3dhall17_init This function initializes all necessary pins and peripherals used for this Click board.
- c3dhall17_default_cfg This function executes a default configuration of 3D Hall 17 Click board.
- c3dhall17_set_op_mode This function sets the operating mode of the device.
- c3dhall17_get_data This function reads and converts the magnetic flux density on all three axes and the die temperature.
- c3dhall17_hw_reset This function performs a hardware reset of the device.

Application Init

Initializes the driver and performs the Click default configuration.

Application Task

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Reads data from the sensor and displays them on the USB UART every 200ms.

Application Output

This Click board can be interfaced and monitored in two ways:

- Application Output - Use the "Application Output" window in Debug mode for real-time data monitoring. Set it up properly by following this tutorial.
- UART Terminal - Monitor data via the UART Terminal using a USB to UART converter. For detailed instructions, check out this tutorial.

Additional Notes and Information

The complete application code and a ready-to-use project are available through the NECTO Studio Package Manager for direct installation in the NECTO Studio. The application code can also be found on the MIKROE GitHub account.

Resources

mikroBUS™

mikroSDK

Click board™ Catalog

Click boards™

ClickID

Downloads

3D Hall 17 Click example package

3D Hall 17 Click schematic v100

3D Hall 17 Click 2D and 3D files v100

AH4931Q-W6-7 datasheet